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(54) MEMBRANE ETANCHE A AUTOVENTILATION ET MEMBRANE PERMEABLE A L'AIR POUR LA CONSTRUCTION DE MURS EXTERIEURS

(54) SELF-VENTING MOISTURE BARRIER AND BREATHER MEMBRANE FOR EXTERIOR WALL SYSTEMS

(57)

An improved breather membrane for walls allowing ventilation as well as being a moisture barrier and breather membrane is provided. A multi-layer asphalt-saturated breather-type building paper which has a corrugated layer and a non-corrugated layer is capable of being positioned in a wall system beneath the exterior finish or cladding as a self venting, water repellant building envelope material. The corrugations provide vertical channels for moisture drainage and for air movement beneath the external cladding.

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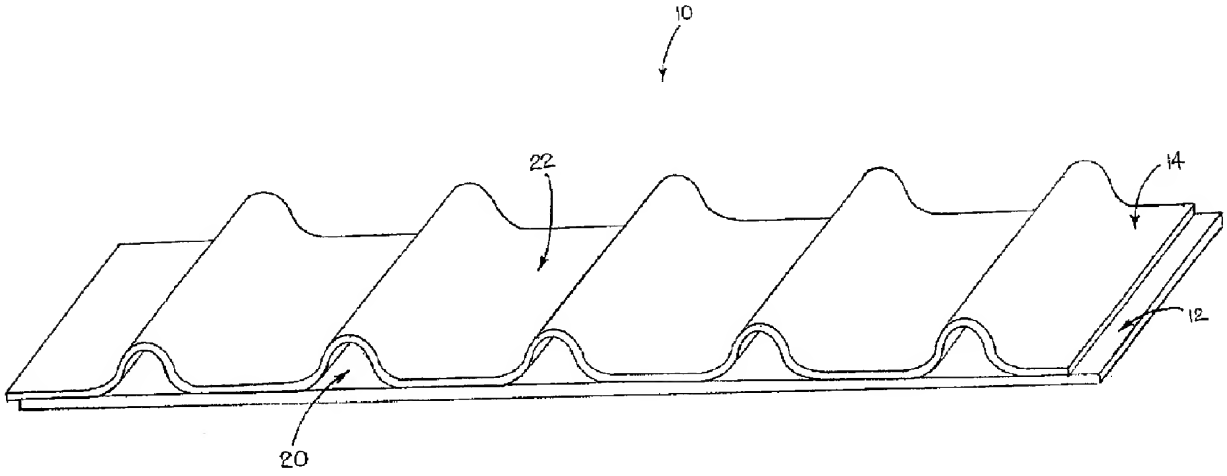
(54) **MEMBRANE ETANCHE A AUTOVENTILATION ET MEMBRANE PERMEABLE A L'AIR POUR LA CONSTRUCTION DE MURS EXTERIEURS**

(54) **SELF-VENTING MOISTURE BARRIER AND BREATHER MEMBRANE FOR EXTERIOR WALL SYSTEMS**



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SELF-VENTING MOISTURE BARRIER AND BREATHER MEMBRANE FOR EXTERIOR WALL SYSTEMS

ABSTRACT

An improved breather membrane for walls allowing ventilation as well as being a moisture barrier and breather membrane is provided. A multi-layer asphalt-saturated breather-type building paper which has a corrugated layer and a non-corrugated layer is capable of being positioned in a wall system beneath the exterior finish or cladding as a self-venting, water repellant building envelope material. The corrugations provide vertical channels for moisture drainage and for air movement beneath the external cladding.

SELF-VENTING MOISTURE BARRIER AND BREATHER MEMBRANE FOR EXTERIOR WALL SYSTEMS

FIELD OF INVENTION

This invention relates to a corrugated, self-venting moisture barrier and breather membrane for exterior wall systems of a building.

BACKGROUND OF THE INVENTION

Water-resistant breather membranes commonly known as building papers, or more recently as house-wraps, have been a component within wall assemblies for many decades. The typical house wall assembly consists of wood (or metal) studs, fastened to top and bottom plates which are themselves fastened to other framing units such as a floor assembly and a roof assembly. On the inside wall surface, a sheet material such as gypsum board is commonly fastened with nails or screws to the wall studs and beneath this finish a vapour barrier sheet, such as polyethylene, is placed. The space between studs is filled with insulation and a rigid sheathing material such as plywood, Oriented Strand Board (OSB) or shiplap lumber is usually fastened to the outer face of the studs. The above assembly forms the structural and thermal protective portions of a typical outside wall. As a final finishing, the weather protective components are installed, consisting of a layer of breathable, water-resistant sheathing membrane and then a layer of cladding.

The layer of breather membrane, commonly referred to as building paper, is intended to function as a barrier against entry of wind-driven or otherwise motivated moisture which bypasses or penetrates the outer cladding. In addition to preventing the entry of outside moisture into the wall assembly, the breather membrane must allow the release of water vapour from within the wall to prevent accumulation and condensation of water within the wall. In this regard it must be a "breather" for water vapour.

In recent years many problems have been encountered with the above described wall assemblies in wet coastal climates. The problems generally involve the inability of the wall assembly to dry itself adequately between periods of rain induced wetting, leading to fungus growth, deterioration of the wood sheathing and rotting of structural members.

For the purpose of energy conservation, building codes have required builders to install more insulation into walls, thus preventing inside source heat from aiding in wall drying, and also to install better, more effective vapour barriers which, however, also function as air barriers. These measures prevent air passage through the wall assembly and eliminate a further drying mechanism (namely, air movement). As a result all drying outside the insulation can only take place to the exterior without the aid of air movement. Further, if the cladding is placed tightly against the wall sheathing it too restricts the release of water vapour out of the wall.

However, if the cladding is spaced away from the wall sheathing allowing entry of air to provide ventilation between sheathing and the cladding, it greatly improves the walls' drying ability. A further benefit of having a space between cladding and sheathing is to help prevent moisture ingress from the cladding by capillary forces. Spacing of cladding away from the wall can be achieved using various types of furring materials such as wood strapping, etc. This method can be laborious and costly.

However, by using a breather membrane manufactured as a corrugated sheet having evenly spaced ridges, or corrugations, the corrugations perform the function of furring materials by spacing the cladding away from the wall sheathing. The corrugations permit entry of ventilating air behind the cladding and also permit easy drainage of any errant moisture which bypasses the cladding.

A number of patents disclose moisture and vapour barriers for buildings, but none with a portion that is corrugated or that otherwise provides a

convenient means for physically separating the exterior cladding from the wall sheathing for the purposes of preventing moisture ingress by capillary action from moist cladding, allowing entry of air between the wall sheathing and the cladding to assist in drying, and allowing downward flow of errant moisture between the wall sheathing and the cladding.

United States Patent No. 4,866,897 (Yount) describes a reinforced composite sheathing paper for use in wall construction between interior framing and exterior materials such as stucco, to provide a single strengthened sheet against which stucco can be applied. No layer of the sheathing paper is corrugated, and the sheathing paper lacks the advantages of a vertically corrugated moisture barrier.

United States Patent No. 5,027,572 (Purcell et al.) discloses a wall system, wherein a moisture and vapour barrier is positioned directly between the substrate and insulation layers of an exterior insulation finish system to provide thermal stability regardless of climatic variations. This moisture and vapour barrier comprises a two-part membrane of multiple cross-laminated layers of polyethylene film fully bonded to a layer of rubberized asphalt. None of the layers of the moisture and vapour barrier are corrugated, nor does Purcell et al. disclose any other means whereby the exterior wall cladding is physically separated from the sheathing. Purcell et al. makes no attempt to permit air movement between the cladding and the wall sheathing to assist in the drying process, but, quite the opposite, specifically aims to add to the insulation value of the overall system by eliminating all air movement in the form of draft.

United States Patent No. 4,543,158 (Bonduc et al.) describes an asphalt-saturated sheet-type felt material used as siding or roofing underlayment. No part of this underlayment is corrugated.

SUMMARY OF THE INVENTION

The problems of the prior art have been overcome by this invention which provides a corrugated self-venting moisture barrier and breather membrane in an exterior wall system. Specifically, this invention combines a number of new functions beneath cladding: air ventilation, furring, and a moisture barrier with a multi-layer corrugated, breather-type, asphalt-saturated building paper. Corrugated paper in general and asphalt-laminated building paper are well known. However, the corrugated product of this invention consists of laminating a layer of non-corrugated, asphalt-saturated breather paper to a layer of corrugated asphalt-saturated breather paper. The laminating is accomplished by applying intermittent strips of adhesive to the non-corrugated sheet just before it meets and joins up with the corrugated sheet. The finished product is then wound into rolls of convenient size. In a wall assembly the laminate is positioned between the outside of the sheathing and the external finish or cladding.

The corrugated building paper of this invention provides vertical channels for moisture drainage and for air movement beneath the external cladding. The vertical drainage channels are provided by the space between the corrugated layer and the non-corrugated layer of the laminate. The vertical air channels are provided by the space between the corrugated layer of the laminate and the sheathing or cladding of the exterior wall system. In each case, the corrugations are rigid enough to resist crushing when cladding is applied.

Another embodiment of the product consists of a layer of non-corrugated, preferably non-coated, porous fibreglass mat laminated to the corrugated asphalt-saturated breather paper. The porous fibreglass mat functions as a backing sheet behind plaster or stucco-cement to prevent the plaster or stucco from filling the corrugation channels but it permits moisture to enter the drainage channels.

The proper placement of the self-venting moisture barrier and breather membrane in exterior wall systems is essential. It is typically held in place in a wall structure by fastening it to the outer sheathing beneath the exterior cladding which may, for example, be wood siding, plastic (vinyl) siding, stucco, synthetic stucco, an exterior insulation finish system (E.I.F.S.), or the like. The corrugated sheets are installed horizontally preferably with the corrugated side facing out for use with solid cladding. For stucco cladding however, the corrugated sheet is preferably placed with corrugations facing in towards the wall cavity and the fibreglass mat facing outward so as to prevent intrusion of stucco into the corrugation channels. The sheets are positioned so that horizontal laps are shingle-style and the corrugated channels are vertically aligned. All moisture which bypasses the cladding should preferably have ready access to the vertical channels for unrestricted drainage. Each sheet must direct this moisture onto the sheet below it and thence to exit the wall assembly at the bottom by way of properly positioned metal flashing. Allowances are made for air entry at the bottom of a wall assembly and the air channels may be open to the attic or soffit space.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective sectional view of the moisture barrier and breather membrane according to the present invention, showing its layers.

Figure 2 is a perspective view of an embodiment of the moisture barrier and breather membrane according to the present invention, in roll form.

Figure 3 is a front elevation view of a partially installed exterior wall system, comprising a wall sheathing, an embodiment of the moisture barrier and breather membrane according to the present invention partially installed on the wall sheathing, and wall cladding partially installed on said moisture barrier and breather membrane.

Figure 4 is a vertical sectional view of an exterior wall system comprising a wall sheathing, an embodiment of the moisture barrier and breather membrane according to the present invention, and solid cladding.

Figure 5 is a vertical sectional view of an exterior wall system comprising a wall sheathing, an embodiment of the moisture barrier and breather membrane according to the present invention, and plaster or stucco cladding.

DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS OF THE INVENTION

Referring to Figure 1, a moisture barrier and breather membrane 10 according to the present invention comprises a non-corrugated layer 12 laminated to a corrugated layer 14. The corrugations should be between about 1/8 inch and about 1/2 inch deep, preferably 1/4 inch deep. The centerlines of the corrugations should be between about 1/2 inch and about 2-1/2 inches apart, preferably 1-1/2 inches. The laminating is accomplished by applying intermittent strips of hot asphalt-based adhesive to layer 12 and then applying layer 14 thereon. Although hot asphalt adhesive is the preferred laminating adhesive, other compatible adhesives may be used.

In one embodiment, a layer of non-corrugated, asphalt-saturated breather paper is laminated to a layer of corrugated asphalt-saturated breather paper. In another embodiment, a layer of non-corrugated, preferably non-coated, porous fibreglass mat is laminated to the layer of corrugated asphalt-saturated breather paper. This second embodiment is especially appropriate for use with plaster or stucco cladding, in that the porous fibreglass mat functions as a backing sheet behind the plaster or stucco to prevent the plaster or stucco from filling the corrugation channels but permits moisture to pass through it. In each case, the corrugations are rigid enough to resist crushing when cladding is applied.

Referring to Figure 2, moisture barrier and breather membrane 10 may then be wound into rolls of convenient size, and may have an optional lap guide marking 16 for ease of installation.

Referring to Figure 3, moisture barrier and breather membrane 10 can be installed into an exterior wall system 26 between a wall sheathing 18 and a wall cladding 24. Wall cladding 24 may, for example, be wood siding, plastic (vinyl) siding, stucco, synethetic stucco, E.I.F.S., or the like. Prior to applying wall cladding 24, sheets of moisture barrier and breather membrane 10 can be unrolled horizontally and fastened to wall sheathing 18, such that the corrugations of layer 14 are vertically oriented on wall sheathing 18. After moisture barrier and breather membrane 10 has been installed, wall cladding 24 can then be applied.

Referring to Figures 1, 4, and 5, the installation of moisture barrier and breather membrane 10 will result in wall cladding 24 being spaced away from the wall sheathing 18 without the need for additional furring materials such as wood strapping. Further, the space between layer 12 and the corrugations of layer 14 provides vertical drainage channels 20 for drainage of moisture that has bypassed layer 14. Also, when installed, the space between the corrugations of layer 14 and wall sheathing 18 or wall cladding 24, as the case may be, provides vertical air channels 22 for the movement of air (and possibly drainage of moisture as well).

To achieve these results, proper installation of moisture barrier and breather membrane 10 is essential. Referring back to Figure 3, the sheets of moisture barrier and breather membrane 10 should be installed in rows on wall sheathing 18 starting at the bottommost edge of wall sheathing 18 and continuing upwards toward the topmost edge of wall sheathing 18. The rows of moisture barrier and breather membrane 10 should be positioned so that horizontal laps are shingle-style, in that higher rows of moisture barrier and breather membrane 10 overlap lower rows of same. The corrugations of each higher row should overlap corrugations of the adjacent lower row preferably about 2 inches so that drainage channels 20 and air

channels 22 are continuous over the full height of wall sheathing 18. For ease of installation, optional lap guide marking 16 serves as a guide as to an appropriate amount of overlap.

Referring to Figure 4, in respect of solid cladding, moisture barrier and breather membrane 10 should preferably be installed on wall sheathing 18 with layer 14 facing away from wall sheathing 18. Referring to Figure 5, for plaster or stucco cladding, however, moisture barrier and breather membrane 10 should preferably be installed on wall sheathing with layer 14 facing toward wall sheathing 18 so as to prevent intrusion of stucco into the corrugation channels.

Referring to Figures 3, 4, and 5, all moisture which bypasses wall cladding 24 should preferably have ready access to drainage channels 20 or air channels 22 for unrestricted drainage. Each installed row of moisture barrier and breather membrane 10 should direct the moisture onto the row below it, and thence to exit the wall system at the bottom by way of properly positioned flashing. Allowances should be made for air entry at the bottom of exterior wall system 26, and air channels 22 may be open to the attic or soffit space above exterior wall system 26. Intermittent spacer strips 28, preferably of treated wood, may be installed at the bottom edge of wall sheathing 18 to allow for air entry into air channels 22. All vertical joints 30 between sheets of moisture barrier and breather membrane 10 should be taped, and all tie-ins to windows and other terminations should similarly be taped. A metal strip stucco edge 32 should be affixed at the bottom of exterior wall system 26 prior to applying stucco wall cladding 24.

Although a particular embodiment of the present invention has been described above, it will be understood by those skilled in the art that various changes and modifications may be made without departing from the spirit or essential attributes of the present invention. Accordingly, the scope of the invention is to be construed in accordance with the substance defined by the following claims.

WHAT IS CLAIMED:

1. A moisture barrier and breather membrane for exterior wall systems comprising a non-corrugated layer laminated to a corrugated layer.

2. A moisture barrier and breather membrane according to claim 1 wherein the corrugations of said corrugated layer are sufficiently rigid to resist crushing when cladding is applied thereon.

3. A moisture barrier and breather membrane according to claim 2 wherein said non-corrugated layer comprises non-corrugated breather-type building paper, and said corrugated layer comprises corrugated breather-type building paper.

4. A moisture barrier and breather membrane according to claim 3 wherein said non-corrugated breather-type building paper and said corrugated breather-type building paper are both asphalt-saturated.

5. A moisture barrier and breather membrane according to claim 4 wherein the corrugations of said corrugated layer are between about 1/8 inch and about 1/2 inch deep.

6. A moisture barrier and breather membrane according to claim 4 wherein the distance between centerlines of corrugations of said corrugated layer is between about 1/2 inch and about 2-1/2 inch.

7. A moisture barrier and breather membrane according to claim 4 capable of being installed in an exterior wall system such that the corrugations of said corrugated layer provide vertical channels along the corrugations for moisture drainage and for air movement within said exterior wall system.

8. A moisture barrier and breather membrane according to claim 2 wherein the non-corrugated layer comprises a non-corrugated fibreglass mat and the corrugated layer comprises corrugated breather-type building paper.

9. A moisture barrier and breather membrane according to claim 8 wherein said corrugated breather-type building paper is asphalt-saturated.

10. A moisture barrier and breather membrane according to claim 9 wherein said non-corrugated fibreglass mat is uncoated.

11. A moisture barrier and breather membrane according to claim 10 wherein the corrugations of said corrugated layer are between about 1/8 inch and about 1/2 inch deep.

12. A moisture barrier and breather membrane according to claim 10 wherein the distance between centerlines of corrugations of said corrugated layer is between about 1/2 inch and about 2-1/2 inch.

13. A moisture barrier and breather membrane according to claim 10 capable of being installed in an exterior wall system such that the corrugations of said corrugated layer provide vertical channels along the corrugations for moisture drainage and for air movement within said exterior wall system.

14. An exterior wall system comprising:

(a) wall sheathing;

(b) wall cladding to the exterior of said wall sheathing; and

(b) a moisture barrier and breather membrane interposed between said wall sheathing and said wall cladding, wherein said moisture barrier and breather membrane comprises a non-corrugated layer laminated to a corrugated layer.

15. The exterior wall system according to claim 14 wherein the corrugations of said corrugated layer are sufficiently rigid to resist crushing when cladding is applied thereon.

16. The exterior wall system according to claim 15 wherein said non-corrugated layer comprises non-corrugated breather-type building paper, and said corrugated layer comprises corrugated breather-type building paper.

17. The exterior wall system according to claim 15 wherein said non-corrugated layer comprises a non-corrugated fibreglass mat and the corrugated layer comprises corrugated breather-type building paper.

18. A method of making a moisture and breather membrane for exterior wall systems comprising laminating a non-corrugated layer to a corrugated layer by applying intermittent strips of adhesive to said non-corrugated layer, and then affixing said corrugated layer thereon.

19. A method of installing a self-venting moisture barrier and breather membrane into an exterior wall system comprising fastening onto wall sheathing, interposed between said wall sheathing and wall cladding, a sheet of moisture barrier and breather membrane comprising a non-corrugated layer laminated to a corrugated layer, such that the corrugations of said corrugated layer are vertically oriented.

20. The method according to claim 19 further comprising the step of allowing moisture to exit vertical drainage channels created by the corrugations of said corrugated layer.

21. The method according to claim 20 further comprising the step of allowing air to enter vertical air channels created by the corrugations of said corrugated layer.

22. The method according to claim 21 wherein a plurality of sheets of said moisture barrier and breather membrane are fastened to said wall sheathing in a shingle-style such that each sheet overlaps any lower adjacent sheet and is overlapped by any higher adjacent sheet, and such that the corrugations of each sheet are vertically aligned with the corresponding corrugations of adjacent sheets.

23. The method according to claim 21 further comprising the step of taping all vertical joints between said sheets themselves, and between said sheets and tie-ins to windows and other terminations.

24. The method according to claim 21 wherein said step of allowing air to enter said vertical air channels involves installing intermittent spacer strips at the bottom edge of said wall sheathing between said wall sheathing and said moisture barrier and breather membrane.

25. The method according to claim 21 wherein said step of allowing air to enter said vertical air channels involves opening the top of said vertical air channels to attic or soffit space.

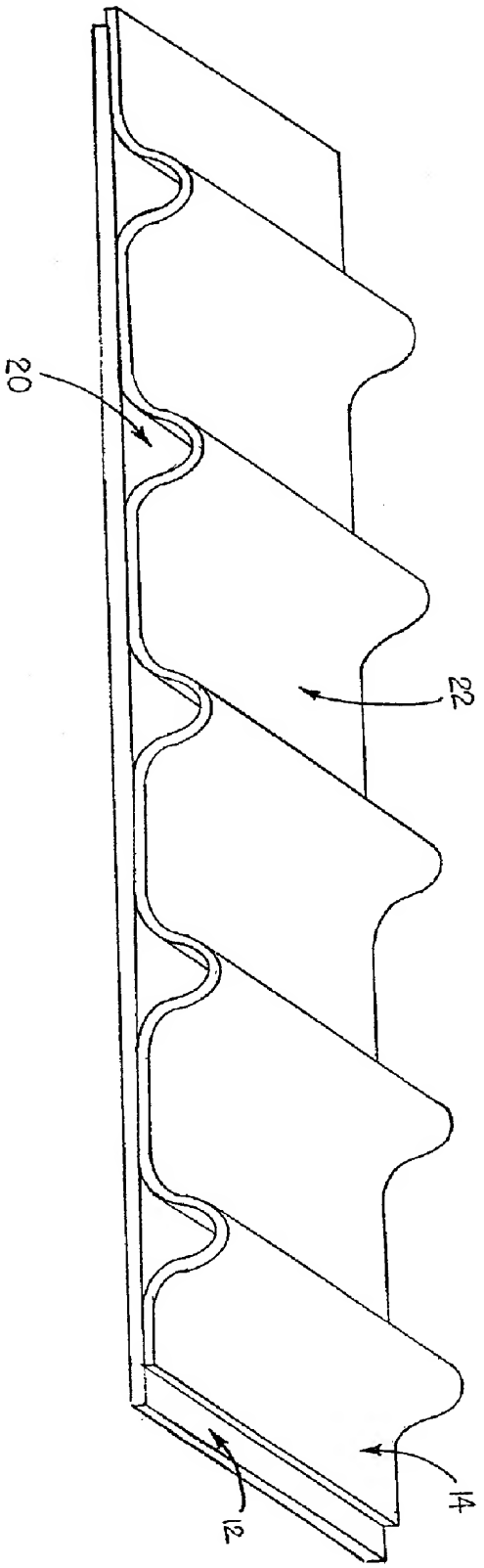
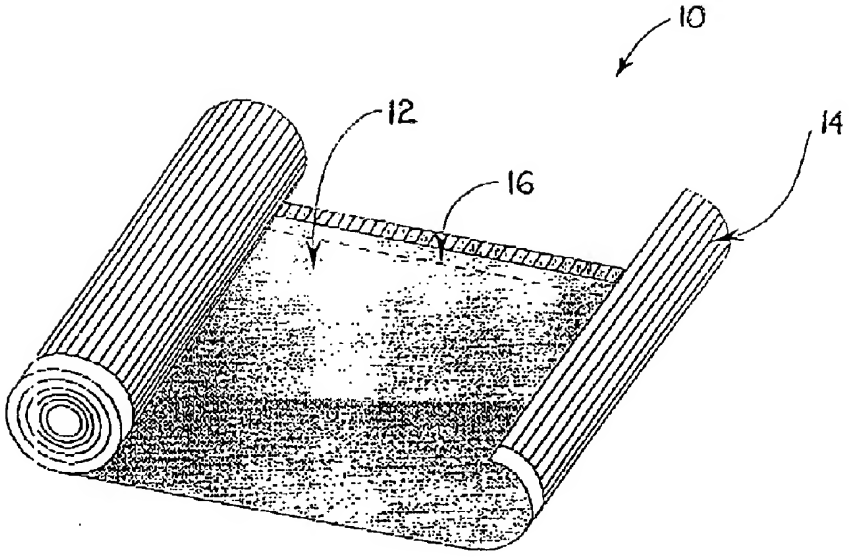


Figure 1

Figure 2



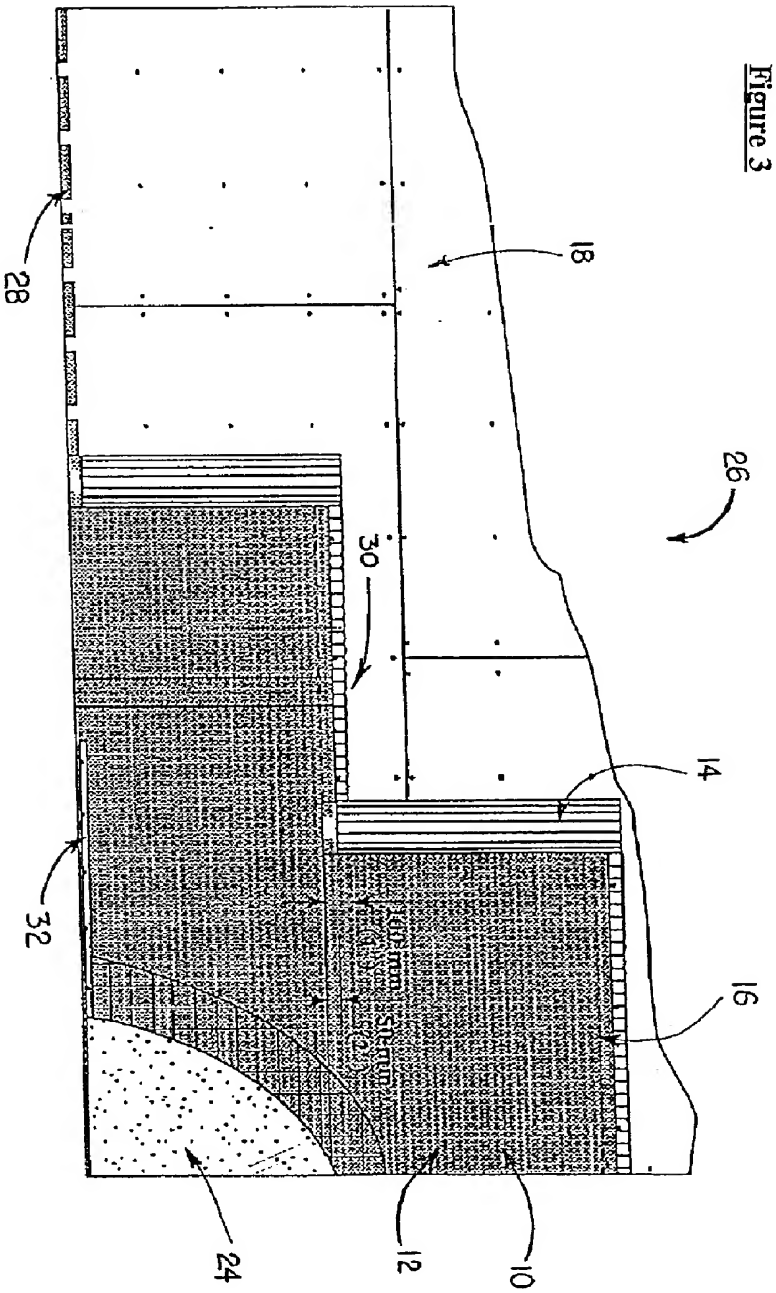


Figure 3

Figure 4

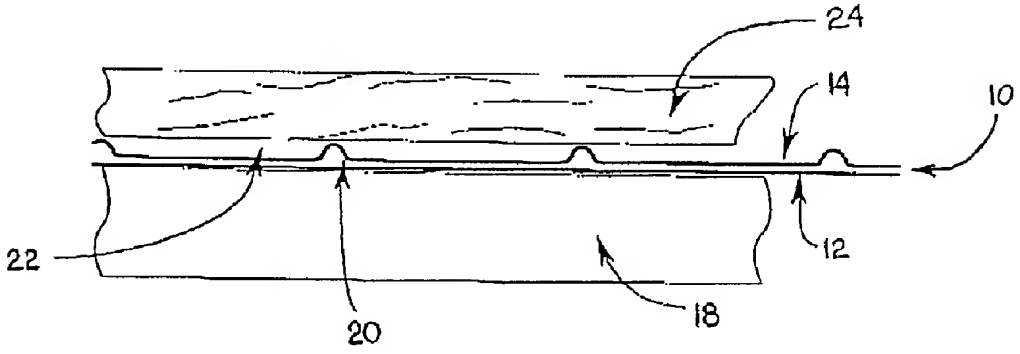


Figure 5